

Performance of a ^4He Melting-Pressure Thermometer in Large Magnetic Fields

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We report on the performance of a ^4He melting-pressure thermometer (MPT) in applied fields of 0 to 1 Tesla. The MPT consists of a small volume of solid and liquid ^4He with a capacitive strain gauge to sense the mixture's pressure. The capacitance of the pressure gauge is read using standard 3-wire bridge techniques using a matched cryogenic reference capacitor. Previously it has been reported that MPTs have a resolution of $\approx 3\text{ nK}/\sqrt{\text{Hz}}$ over a temperature range of 1.8 K to 2.4 K.¹ Since ^4He and the materials used in the construction of the MPTs are only very weakly affected by magnetic fields, the MPT can be reliably used in large ambient magnetic fields. The absolute stability of the MPT was tested against the fixed temperature given by the lambda transition temperature in ^4He at saturated vapor pressure. The stability was characterized as a function of applied field from 0 to 1 Tesla at the thermometer. Also, the MPT was compared against a SrTiO_3 capacitance temperature sensor to measure shifts in the overall sensitivity of the MPT.

¹ I. S. Goldner, N. Mulders, and G. Ahlers, in the *Proc. 7th Int. Symp. Temp.*, 113 (1992).